Mapping From a Clinical Data Warehouse to the HL7 Reference Information Model

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Abstract

Large-scale data integration efforts to support clinical and biologic research are greatly facilitated by the adoption of standards for the representation and exchange of data. As part of a larger project to design the necessary architecture for multi-institutional sharing of disparate biomedical data, we explored the potential of the HL7 Reference Information Model (RIM) for representing the data stored in a local academic clinical data warehouse. A necessary first step in information exchange with such a warehouse is the development and utilization of tools for transforming between local data schemas and standards-based conceptual data models. We describe our initial efforts at mapping clinical concepts from a relational data warehouse to the HL7 RIM.

Introduction

Development and adoption of standards to support meaningful information representation and exchange between disparate systems is an important goal in the informatics community. The HL7 Reference Information Model is a developing standard explicitly targeted to enable "consistent sharing and usage of data across multiple "local" contexts"[1]. We have undertaken a multi-disciplinary, multi-institutional project focused on the high-level design of a system for integrating disparate biomedical data to facilitate research, health promotion, and quality assessment. Our approach involves the development of a central data warehouse that imports data from source systems in HL7 RIM-compliant methods. Similar to mapping a local set of laboratory codes to LOINC, creating tools to support the mapping of local data models to a standard such as the RIM offers great potential for facilitating data exchange among source systems. To explore this approach, we attempted to map from a local clinical data warehouse containing administrative, financial, and laboratory patient data to RIM-based classes, exporting data in XML format.

The UVa Clinical Data Repository (CDR)

The CDR is a relational database that contains information about patients seen at the University of Virginia Health System[2]. It is a WWW-based system designed to facilitate research, quality assessment, and medical education by allowing direct access to retrospective administrative, financial, and laboratory data.

Mapping to the HL7 RIM

Several weeks were spent studying the RIM object model, using realistic clinical scenarios to explore how basic concepts were represented. We then began a table-by-table approach to mapping from CDR data elements to attributes in the RIM. Finally, one of the authors (JD) developed a WWW-based prototype tool to export data from specific CDR tables in RIM-based XML documents.

Challenges

The RIM must provide a comprehensive framework for the representation of an enormous variety of healthcare-related concepts, in part by allowing a large degree of abstraction. An unintended consequence for developers is the complexity of applying the RIM. For example, data stored in one local *"Patient"* table requires mapping data to at least five classes in the RIM: *Role, Entity, Living Subject, Person,* and *Organization*. Despite these challenges, we have found that data elements encountered in the data warehouse so far have appropriate representations in the RIM.

Conclusion

Developing standards-based approaches for exporting data from/to larger warehouses is essential for widespread sharing and accessibility of biomedical data. We explored the suitability of the developing HL7 RIM for representing concepts in a local academic data warehouse, and began the development of a WWW-based tool for transforming local data to RIM-compliant XML documents.

References

[1] http://www.hl7.org/

[2] Scully KW, Pates RD, Desper GS, Connors AF, Harrell FE, Pieper KS, Hannan RL, Reynolds RE. Development of an enterprise-wide clinical data repository merging multiple legacy databases. *AMIA Ann Symp*, 1997.